

Spectral Analysis Activities

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These activities were designed to aid student understanding of spectral analysis, what the patterns mean, how elements are involved, and how this relates to stars. Traditionally, spectral images are two dimensional, and related to text. The auditory activity allows students to “hear” differences in patterns of various elements. The kinesthetic activity encourages students to use their bodies to “make” patterns.

These activities are appropriate to 9th grade and high school space studies elements of Science courses.

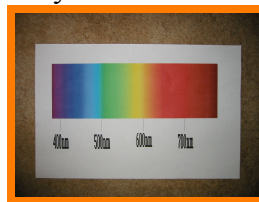
Background:

- http://imagine.gsfc.nasa.gov/docs/science/how_11/spectral.html
- Appendix : Student Background Sheet

I. Auditory: **“Nickel-odeon”**

In this activity, students can display approximations of patterns of various elements on a spectrum which is placed upon the keys of a piano keyboard. The bands are represented by dark lines made by painted toothpicks.

1. Print the visible light image saved in PDF. Zoom to tabloid size, and cut to strips for keys of keyboard.



2. Label one side of a keyboard “blue”, and the other side “red”.



3. Provide a solid form of the spectrum so that students can see the intact, uncut view.
4. Using black paper or tape strips, model two sample “prints” (one for H and one for He) (or nickel – to include the name of the activity). One source for emission line spectra of the elements is <http://home.achilles.net/~jtalbot/data/elements/>
OR, color toothpicks with black marker, and place on the spectrum model in the appropriate place.



5. Explain the models to the students.
6. “Play” the chord that results from the markings, and allow students to “hear” the element – the sound that results when H is “played” or He is “played”.
7. Encourage small groups of students to take turns creating their own “chords” for other elements, and design opportunities for discussion.
8. Explain that this is only a simulated model.
9. Transfer the experience to the concept.



II. Kinesthetic: **“Analyze This!”**

In this activity, students use their bodies to make patterns of the bands.

Alternative Activity:

An enlarged visible spectrum may be placed on a wall or white board. A curtain rod construction can be mounted above. Bands can be suspended from this

1. Using paint, represent the visible light spectrum on mural paper.
2. OR - Using a colour printer, print the visible spectrum on an overhead, and project it on a white board.
3. OR project a spectrum from an LCD
4. Groups of students (perhaps volunteers could dress in black), position themselves along the spectrum to model various element “prints”.
5. Connect the model to the scientific concept.
6. As added interest, a digital camera could be used to get pictures of the students as they model the element patterns, and pictures could be printed

rod, and slid into place to construct patterns.

and posted on a wall that displays the elements.



Resources

http://imagine.gsfc.nasa.gov/docs/science/how_11/spectra.html

http://spaceresearch.nasa.gov/research_projects/light_06-2002.html

<http://imagers.gsfc.nasa.gov/ems/visible.html>

<http://home.achilles.net/~jtalbot/data/elements/>
Spectra of Gas Discharges

<http://hea-www.harvard.edu/~efortin/thesis/html/Spectroscopy.shtml>
Spectroscopy

<http://can-do.com/uci/ssi2001/emspectrum.html>
WebQuest: Electromagnetic Spectrum

<http://www.can-do.com/uci/ssi2000/cosmicchemistry.html>
Cosmic Chemistry WebQuest